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# **An Integrated System for Real-Time CTD Profiling Float Data on Basin Scales**

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## **LONG-TERM GOALS**

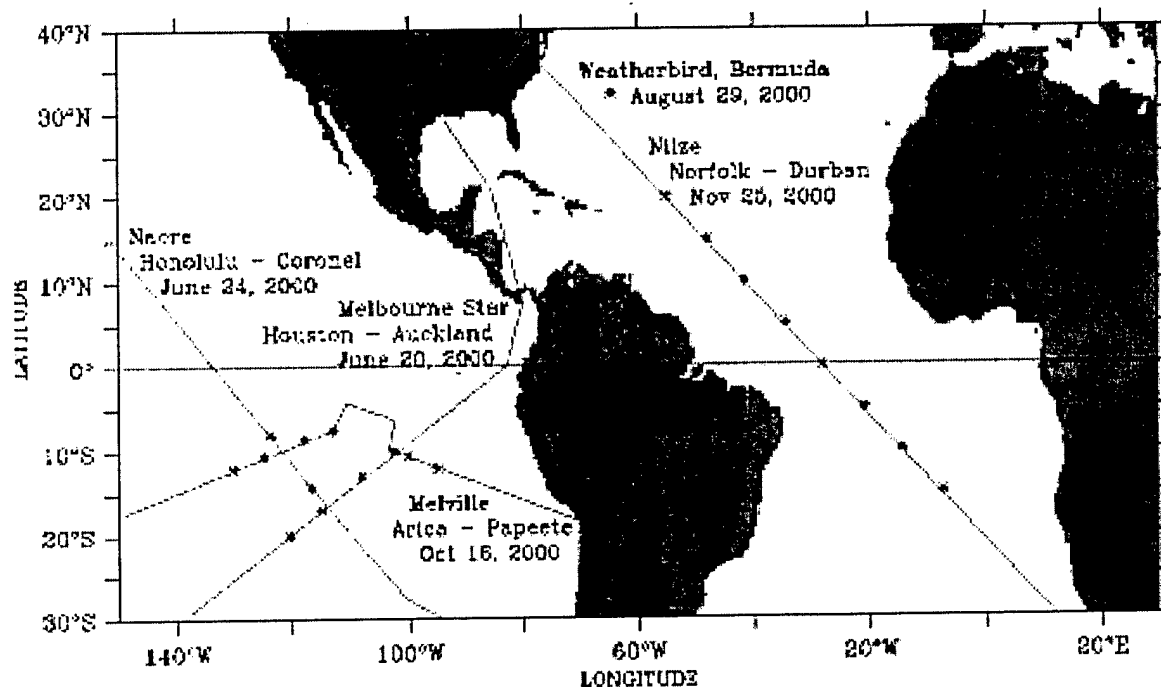
This award, together with those at our partner institutions (see below), initiates the U.S. component of the international Argo Project, via the National Ocean Partnership Program (NOPP). By 2005, Argo will deploy a global array of 3000 profiling CTD floats (Argo Science Team, 1998), plus a data system that will make all Argo data available to both operational users of real-time data and to scientific users of a high-quality data stream. The Argo array will provide unprecedented real-time views of the evolving physical state of the ocean. It will reveal the physical processes that balance the large-scale heat and freshwater budgets of the ocean and will provide a crucial dataset for initialization and assimilation in seasonal-to-decadal forecast models. Argo is a major initiative in oceanography, merging research and operational objectives to provide a uniquely valuable global dataset for climate science and other applications.

## **OBJECTIVES**

Phase I of U.S. Argo will provide 55 profiling floats in the tropical Pacific and Atlantic Oceans. The Scripps part of this includes 22 floats in the tropical Pacific. These floats will demonstrate technological capabilities for fabrication and deployment of arrays in remote ocean locations. Recent technology developments will also be implemented during this deployment. New generation salinity sensors will be utilized for improved data quality. Capability for float deployments from fast ships and aircraft will be further developed to ensure that the Argo array can be successfully installed globally without dependency on research vessels. While the Argo data system is being developed by our partner institutions, we will participate through the delayed-mode quality control of profiles from SIO instruments.

## **APPROACH**

Initial deployments of Argo floats have been identified for the Pacific and Atlantic (Fig 1), using both Volunteer Observing Ships and research vessels. This figure includes floats provided by SIO and by our partner institutions, University of Washington and Woods Hole Oceanographic Institution.



*1. Positions of initial U.S. Argo float deployments, Pacific and Atlantic Oceans. Ship tracks are shown in red, with black symbols for float locations.*

## WORK COMPLETED

Four floats have been built and shipped – two were deployed from M/V Nacre (Fig 1) and two will shortly be deployed from R/V Melville.

Fabrication of the remaining 18 SIO floats is nearly completed and these will be shipped and deployed during the next 6-8 months, as deployment opportunities become available.

All data have been forwarded to the U.S. Argo Data at NOAA/AOML in Miami.

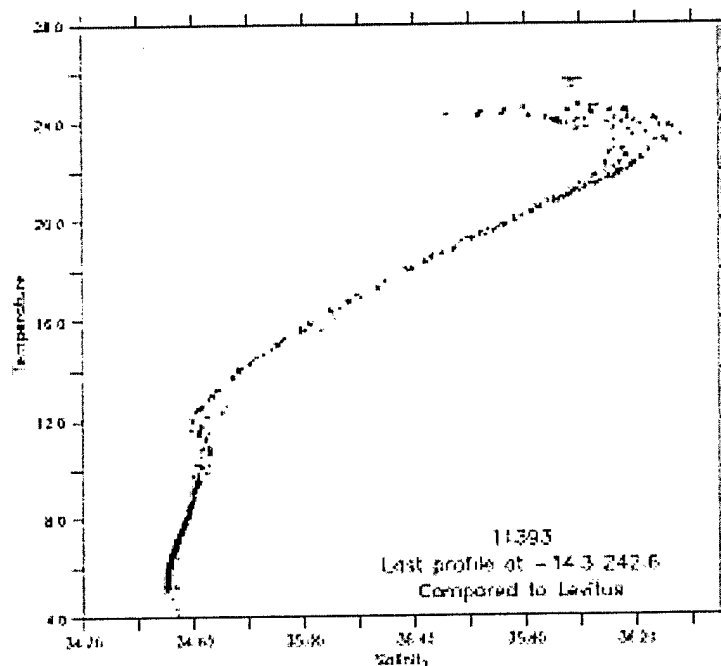
## RESULTS

Of the two floats deployed in early July, both are operating normally, cycling to 1000 m parking depth every 10 days and returning a CTD profile collected while rising to the sea surface. Initial data quality appears excellent. T/S diagrams from both floats are very tight in the thermocline (Fig 2 shows one of these) and in good agreement with the Levitus climatology.

## IMPACT/APPLICATION

Demonstration of the ability to deploy and maintain large-scale profiling float arrays in Phase I and II of U.S. Argo, as well as the public distribution of real-time and delayed mode datasets will confirm the

practicality of the program. Utilization of the Argo profiles in regional-to-global data assimilation systems will confirm its value.



2. *T/S diagram for the 7 cycles of data obtained so far from float 11393. The most recent position was 137.4°W, 14.3°S. Dark symbols are float data and green symbols are from Levitus climatology.*

## TRANSITIONS

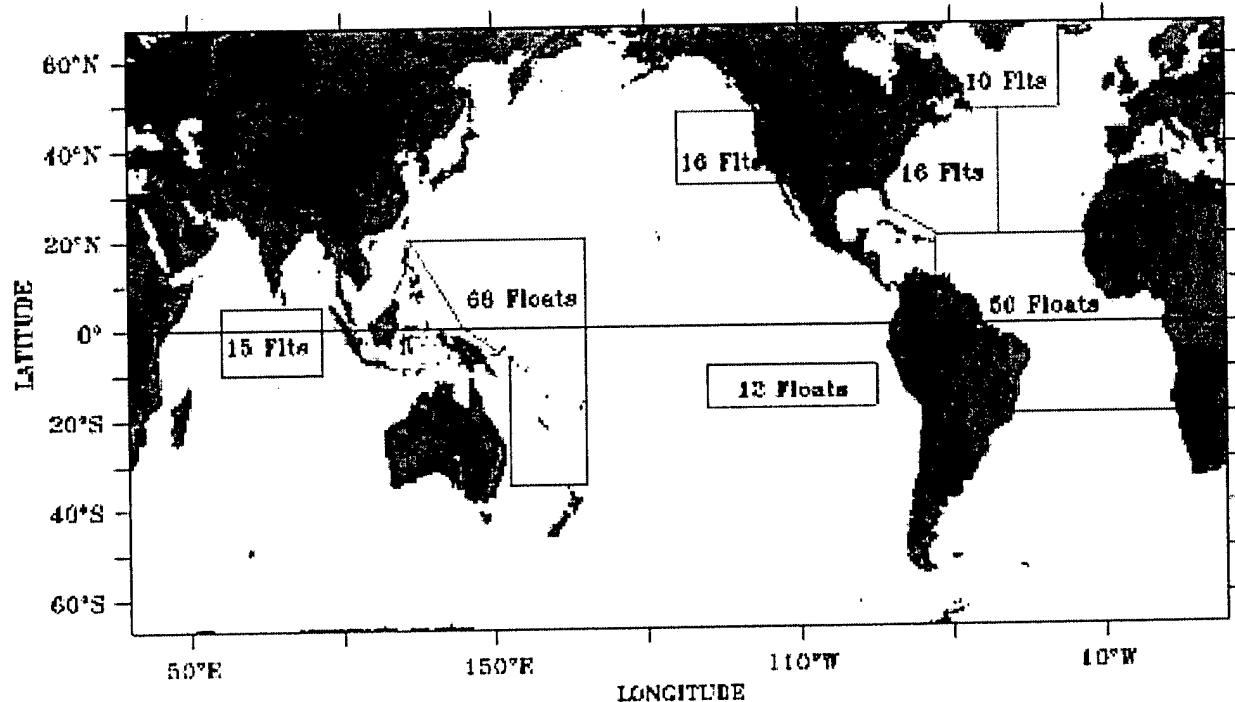
At a recent meeting of U.S. Argo principal investigators, Argo data users, and program managers it was decided to integrate the Phase I and Phase II deployments according to the plan shown in Fig 3. These deployments complement funded near-term deployments by international Argo partners (European countries, Canada, and New Zealand) as well as existing deployments of profiling floats from other U.S. projects in the North Atlantic and tropical Pacific, with the intention of building a complete Argo array in the Atlantic within 3 years. The tropical Pacific array will ramp up on a similar time-scale because of its anticipated high impacts on seasonal-to-interannual forecast capabilities as well as on fundamental science issues.

## RELATED PROJECTS

1 – Other float-providing principal investigators in U.S. Argo are B. Owens and R. Schmitt of Woods Hole Oceanographic Institution and S. Riser of University of Washington.

2 – Lead principal investigators responsible for building the U.S. Argo Data System are R. Molinari of NOAA/AOML (Argo Data Center, real-time data stream) and G. Johnson of NOAA/PMEL (delayed mode quality control).

3 – A variety of data assimilation projects are dependent on successful deployment of the Argo array, including assimilation research activities under NOPP as well as operational modeling in the Navy and NOAA and modeling programs in partner countries as part of the Global Ocean Data Assimilation experiment.



*3. Target regions for deployment of U.S. Argo floats, including 55 floats from Phase I and 132 floats from Phase II. These will complement concurrent Argo deployments by partner countries and existing U.S. profiling float arrays in the North Atlantic and eastern and central tropical Pacific.*

## REFERENCES

Argo Science Team, 1998. On the design and implementation of Argo: A global array of profiling floats. International CLIVAR Project Office Report No. 21